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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/967,048	09/28/2001	Athanasios A. Kasapi	15685P108	4810

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EXAMINER

NGUYEN, KHAI MINH

ART UNIT	PAPER NUMBER
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2617

DATE MAILED: 09/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/967,048	<b>Applicant(s)</b> KASAPI, ATHANASIOS A.	
	<b>Examiner</b> Khai M. Nguyen	<b>Art Unit</b> 2617	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 26 June 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Response to Arguments*

1. Applicant's arguments with respect to claims 1-21 have been considered but are moot in view of the new ground(s) of rejection.

### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-21 are rejected under 35 U.S.C. 102(e) as being anticipated by Shattil (U.S.Pub-20030147655).

Regarding claim 1, Shattil teaches a method comprising:

receiving information for transmission to a receiver (fig.4a-4c, input data 412, plurality of carrier mixers 414n, 416n, 418n, paragraph 0100); and

generating a plurality of sub-carriers (fig.4a-4c, plurality of carrier mixers 414n, 416n, 418n) to redundantly transmit the information over a multi-carrier wireless communication channel (fig.4a-4c, plurality of carrier mixers 425n, antennas 424n, paragraph 0118-0119, 0122), wherein each of the sub-carriers (fig.4a-4c, plurality of carrier mixers 414n, 416n, 418n) is modified by a set of complex weights to ensure that

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each of the sub-carriers of the wireless communication channel propagates along a different physical path to the receiver (fig.4a-4c, plurality of carrier mixers 414n, 416n, 418n, 422n (sub-carriers/different paths), abstract, paragraph 0118-0119, 0198).

Regarding claim 2, Shattil teaches a method according to claim 1, wherein each element of the set of complex weights scales one or more of a sub-carriers amplitude and/or phase at an associated transmission antenna (fig.4a-4c, plurality of carrier mixers 425n, antennas 424n, paragraph 0118-0119).

Regarding claim 3, Shattil teaches a method according to claim 1, further comprising developing a set of complex weights including (fig.15, paragraph 0213-0214):

choosing substantially different weights (fig.4a-4c, plurality of carrier mixers 414n, 416n, 418n, 422n (sub-carriers/different paths/different weighting)), for each sub-carrier sharing information (fig.4a-4c, and 15 plurality of carrier mixers 414n, 416n, 418n, 422n (sub-carriers/different paths), abstract, paragraph 0100); and iteratively repeating until all sub-carriers have been modified (fig.4a-4c, paragraph 0106).

Regarding claim 4, Shattil teaches a method according to claim 3, wherein the substantially different weights are chosen to be orthogonal to the others (paragraph 0147, 0149).

Regarding claim 5, Shattil teaches a method according to claim 3, wherein developing a set of complex weights (fig.15, paragraph 0213-0214) comprises: selecting weight vector(s) to be applied to each of the sub-carriers from a pre-determined set of

weight vectors (fig.4a-4c, plurality of carrier mixers 414n, 416n, 418n, 422n (sub-carriers/different paths), abstract, paragraph 0118-0119, 0198).

Regarding claim 6, Shattil teaches a method according to claim 1, further comprising: transmitting the modified sub-carriers through one or more antenna (e) to the receiver (fig.4a-4c, plurality of carrier mixers 425n, antennas 424n, paragraph 0118-0119).

Regarding claim 7, Shattil teaches a transceiver comprising:

a diversity agent (fig.4c, diversity 470, paragraph 0004, 0122), operable to selectively develop and apply a set of complex weight values to each of a plurality of signals (fig.4a-4c, plurality of carrier mixers 425n, antennas 424n, paragraph 0118-0119, 0122), each corresponding to a sub-carrier of a multi-carrier communication channel (fig.4a-4c, plurality of carrier mixers 425n, antennas 424n, paragraph 0118-0119, 0122), to introduce spatial diversity between such sub-carriers (fig.4c, diversity 470, paragraph 0004, 0122); and

a transmit module (fig.4c, and 5b, antennas 424n), operable coupled with the diversity agent (fig.4a-4c, plurality of carrier mixers 425n, antennas 424n, paragraph 0118-0119, 0122), to receive the modified sub-carriers (fig.4a-4c, input data 412, plurality of carrier mixers 414n, 416n, 418n, paragraph 0100) and transmit the signals to generate the multi-carrier communication channel with intra-channel spatial diversity (fig.4a-4c, plurality of carrier mixers 425n, antennas 424n, paragraph 0118-0119, 0122).

Regarding claim 8, Shattil teaches a transceiver according to claim 7, wherein the plurality of signals received from at the diversity agent are baseband signals (paragraph 0004, 0100).

Regarding claim 9, Shattil teaches a transceiver according to claim 7, wherein the multi-carrier communication channel is comprised of a plurality of sub-carrier signals (fig.4a-4c, plurality of carrier mixers 425n, antennas 424n, paragraph 0118-0119, 0122), each having a disparate set of complex weights introduced at a baseband of the sub-carriers to effect the spatial diversity between the sub-carriers (paragraph 0004, 0100).

Regarding claim 10, Shattil teaches a transceiver according to claim 7, wherein each of the set of complex weight values are comprised of a plurality of weight values each associated with one of a plurality of antennae (fig.4c, antennas 424n) comprising an antenna array through which the sub-carriers are transmitted (fig.4a-4c, plurality of carrier mixers 425n, antennas 424n, paragraph 0118-0119, 0122).

Regarding claim 11, Shattil teaches a transceiver according to claim 10, wherein the diversity agent develops the set of complex weight values for a given baseband signal to be maximally orthogonal complex weight values applied to another baseband signal (paragraph 0147, 0149).

Regarding claim 12, Shattil teaches a transceiver according to claim 10, wherein the diversity agent is operable to develop a set of complex weight vectors for a sub-carrier (fig.4a-4c, diversity 470, paragraph 0004, 0122) that are substantially different

from weight vectors modifying other sub-carriers that include at least a subset of information carried by the sub-carrier (fig.14a-14d, paragraph 0196, 0198).

Regarding claim 13, Shattil teaches a transceiver according to claim 7, wherein the transmit module is operable to upconvert and amplify each of the modified baseband signals to generate a plurality of spatially diverse sub-carriers (fig.4c, paragraph 0113).

Regarding claim 14, Shattil teaches a transceiver according to claim 13, wherein the transmit module operable to transmit each of the sub-carriers to one or more receiver(s) (fig.4a-4c, plurality of carrier mixers 425n, antennas 424n, paragraph 0118-0119).

Regarding claim 15, Shattil teaches a transceiver according to claim 7, further comprising: a memory operable to store content (paragraph 0124, 0156); and control logic, coupled to the memory (paragraph 0124, 0156), operable to access and process at least a subset of the content to implement the diversity agent (fig.4a-4c, plurality of carrier mixers 425n, antennas 424n, paragraph 0004, 0198).

Regarding claim 16, Shattil teaches the method of claim 1, wherein the multi-carrier wireless communication channel uses Orthogonal Frequency Division Multiplexing (OFDM) (paragraph 0147, 0149).

Regarding claim 17, Shattil teaches the transceiver of claim 7, wherein the multi-carrier wireless communication channel uses Orthogonal Frequency Division Multiplexing (OFDM) (paragraph 0147, 0149).

Regarding claim 18, Shattil teaches the transceiver of claim 7, wherein the transceiver is selected from a base station and a wireless telephony subscriber unit (abstract).

Regarding claim 19, Shattil teaches the transceiver of claim 7, wherein the diversity agent develops the set of complex weights to have inter-channel spatial diversity (paragraph 0004, 0122) with respect to at least one communication channel of at least one other transceiver (paragraph 0147, 0149).

Regarding claim 20, Shattil teaches a subscriber unit comprising:

a diversity agent (fig.4c, diversity 470, paragraph 0004, 0122), operable to selectively develop and apply a set of complex weight values to each of a plurality of signals (fig.4a-4c, plurality of carrier mixers 425n, antennas 424n, paragraph 0118-0119, 0122), each corresponding to a sub-carrier of a multi-carrier communication channel (fig.4a-4c, plurality of carrier mixers 425n, antennas 424n, paragraph 0118-0119, 0122), to introduce spatial diversity between such sub-carriers (fig.4c, diversity 470, paragraph 0004, 0122); and

a transmit module (fig.4c, and 5b, antennas 424n), coupled with the diversity agent (fig.4a-4c, plurality of carrier mixers 425n, antennas 424n, paragraph 0118-0119, 0122), operable to receive the modified sub-carriers (fig.4a-4c, input data 412, plurality of carrier mixers 414n, 416n, 418n, paragraph 0100) and transmit the signals to generate the multi-carrier communication channel with intra-channel spatial diversity (fig.4a-4c, plurality of carrier mixers 425n, antennas 424n, paragraph 0118-0119, 0122).



Regarding claim 21, Shattil teaches a transceiver according to claim 7, wherein each of the set of complex weight values are comprised of a plurality of weight values each (fig.4a-4c, input data 412, plurality of carrier mixers 414n, 416n, 418n) associated with one of a plurality of antennae comprising an antenna array through which the sub-carriers are transmitted (fig.4a-4c, plurality of carrier mixers 425n, antennas 424n, paragraph 0118-0119, 0122).

### **Conclusion**

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khai M. Nguyen whose telephone number is 571.272.7923. The examiner can normally be reached on 8:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, George Eng can be reached on 571.272.7495. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Khai Nguyen  
AU: 2617

  
GEORGE ENG  
SUPERVISORY PATENT EXAMINER

9/15/2006